

What is claimed is:

- 1                    1.        A method of determining product performance comprising the  
2        steps of:  
3                    collecting product performance data;  
4                    determining the failure mode of detected product failures;  
5                    conducting a failure mode effect and analysis procedure to determine a  
6        degree of risk of a detected failure; and  
7                    developing corrective action to correct the detected failures.
- 1                    2.        The method of claim 1 wherein determining the degree of risk  
2        comprises the steps of:  
3                    determining the severity of the effect of each failure; and  
4                    determining the frequency of occurrence of the effect of each failure.
- 1                    3.        The method of claim 2 further comprising the step of:  
2                    ranking the determined severity of effects of a plurality of different  
3        detected failures to generate a plurality of different severity ranking values; and  
4                    ranking the determined frequency of occurrences of a plurality of  
5        different failures in ranked frequency of occurrence values.
- 1                    4.        The method of claim 3 further comprising the step of:  
2                    determining a preliminary risk assessment of each failure as a product  
3        of the ranked severity value and the selected ranked frequency of occurrence value.
- 1                    5.        The method of claim 4 further comprising the step of:  
2                    comparing the preliminary risk assessment with a threshold to  
3        determine high risk assessments.

1                   6.       The method of claim 5 further comprising the step of:  
2                   determining the root cause of detected product failures for product  
3 failures having a preliminary risk assessment at least equal to a threshold.

1                   7.       The method of claim 1 further comprising:  
2                   assigning a severity rank value to the each failure effect; and  
3                   assigning a rank value to the determined frequency of occurrence of  
4 each failure effect.

1                   8.       The method of claim 1 further comprising the step of:  
2                   verifying the corrective action.

1                   9.       The method of claim 8 wherein the step of verifying the  
2 corrective action comprises the step of:  
3                   ranking a validation of a failure corrective action based on at least one  
4 of the type of validation test, the sample size and the test time.

1                   10.      The method of claim 9 further comprising the step of:  
2                   determining a final risk assessment for each corrective action equal to  
3 the product of the determined severity value, the determined frequency of occurrence  
4 value and the determined failure correction validation value.

1                   11.      The method of claim 10 further comprising the step of:  
2                   comparing the final risk assessment value with a threshold to determine  
3 failures requiring corrective action.

1                   12.      The method of claim 1 wherein the step of collecting failing  
2 product performance data comprises the step of:  
3                   forming a plurality of selectable databases containing product  
4 performance data for at least two of field performance, product change request,  
5 manufacturing performance, validation performance, prototype and pilot build

6 inspection, measurement system performance, simulation, supplier development  
 7 performance, process control, production process capability performance,  
 8 manufacturing preventive maintenance, engineering development test performance,  
 9 lessons learned, engineering calculations, dimensional tolerance stack-up analysis,  
 10 internal/external part interface analysis, new customer requirement, supplier  
 11 requirement, cost improvement, drawing change and tool wear.

1 13. The method of claim 12 further comprising the step of:  
 2 forming summary statistics of product performance failures for each  
 3 selected product performance data database.

1 14. The method of claim 1 further comprising the step of:  
 2 determining the cost of quality assessment.

1 15. The method of claim 14 wherein the step of determining the  
 2 cost of quality assessment comprises the step of:  
 3 determining the total cost of quality assessment by the sum of  
 4 prevention costs, appraisal costs and failure costs.

1 16. A method of determining product performance comprising the  
 2 steps of:  
 3 collecting product performance data;  
 4 determining the failure mode of detected product failures;  
 5 determining probability of occurrence of each detected failure;  
 6 ranking the probabilities of occurrence of each failure to obtain a  
 7 occurrence value;  
 8 determining the severity of effects of each failure;  
 9 ranking the severity effects of each failure to obtain a ranked severity  
 10 effect value; and  
 11 determining a preliminary risk assessment of each failure as a product  
 12 of the ranked severity value and the ranked frequency of occurrence value.

- 1                    17.     The method of claim 16 further comprising:  
2                    comparing the preliminary risk assessment with a threshold to  
3                    determine high risk assessments.
- 1                    18.     The method of claim 17 further comprising the step of:  
2                    determining the root cause of detected product failures for product  
3                    failures having a preliminary risk assessment at least equal to a threshold.
- 1                    19.     The method of claim 18 further comprising the step of:  
2                    developing a corrective action to the determined root cause of the  
3                    detected product failure; and  
4                    verifying the corrective action.
- 1                    20.     The method of claim 19 wherein the step of verifying the  
2                    corrective action comprises the step of:  
3                    ranking a validation of a failure corrective action based on at least one  
4                    of the type of validation test, the sample size and the test time.
- 1                    21.     The method of claim 20 further comprising the step of:  
2                    determining a final risk assessment for each corrective action equal to  
3                    the product of the determined severity value, the determined frequency of occurrence  
4                    value and the determined failure correction validation value.
- 1                    22.     The method of claim 21 further comprising the step of:  
2                    comparing the final risk assessment value with a threshold to determine  
3                    failures requiring corrective action.
- 1                    23.     An apparatus for determining product performance comprising:  
2                    means for collecting product performance data;  
3                    means for determining the failure mode of detected product failures;

4 means for determining probability of occurrence of each detected  
5 failure;

6 means for ranking the probabilities of occurrence of each failure to  
7 obtain a occurrence value;

8 means for determining the severity of effects of each failure;

9 means for ranking the severity effects of each failure to obtain a ranked  
10 severity effect value; and

11 means for determining a preliminary risk assessment of each failure as  
12 a product of the ranked severity value and the ranked frequency of occurrence value.

1 24. The apparatus of claim 23 further comprising:

2 means for comparing the preliminary risk assessment with a threshold  
3 to determine high risk assessments.

1 25. The apparatus of claim 24 further comprising the step of:

2 means determining the root cause of detected product failures for  
3 product failures having a preliminary risk assessment at least equal to a threshold.

1 26. The apparatus of claim 25 further comprising the step of:

2 means for developing a corrective action to the determined root cause  
3 of the detected product failure; and

4 means for verifying the corrective action.

1 27. The apparatus of claim 26 wherein the step of verifying the  
2 corrective action comprises the step of:

3 means for ranking a validation of a failure corrective action based on at  
4 least one of the type of validation test, the sample size and the test time.

1 28. The apparatus of claim 27 further comprising the step of:

1                    29.     The apparatus of claim 28 further comprising the step of:  
2                    comparing the final risk assessment value with a threshold to determine  
3                    failures requiring corrective action.

1                   31.       The method of claim 16 wherein the step of comparing the  
2 preliminary risk assessment with a threshold further comprises the step of:  
3                   defining the threshold as a customer override input.